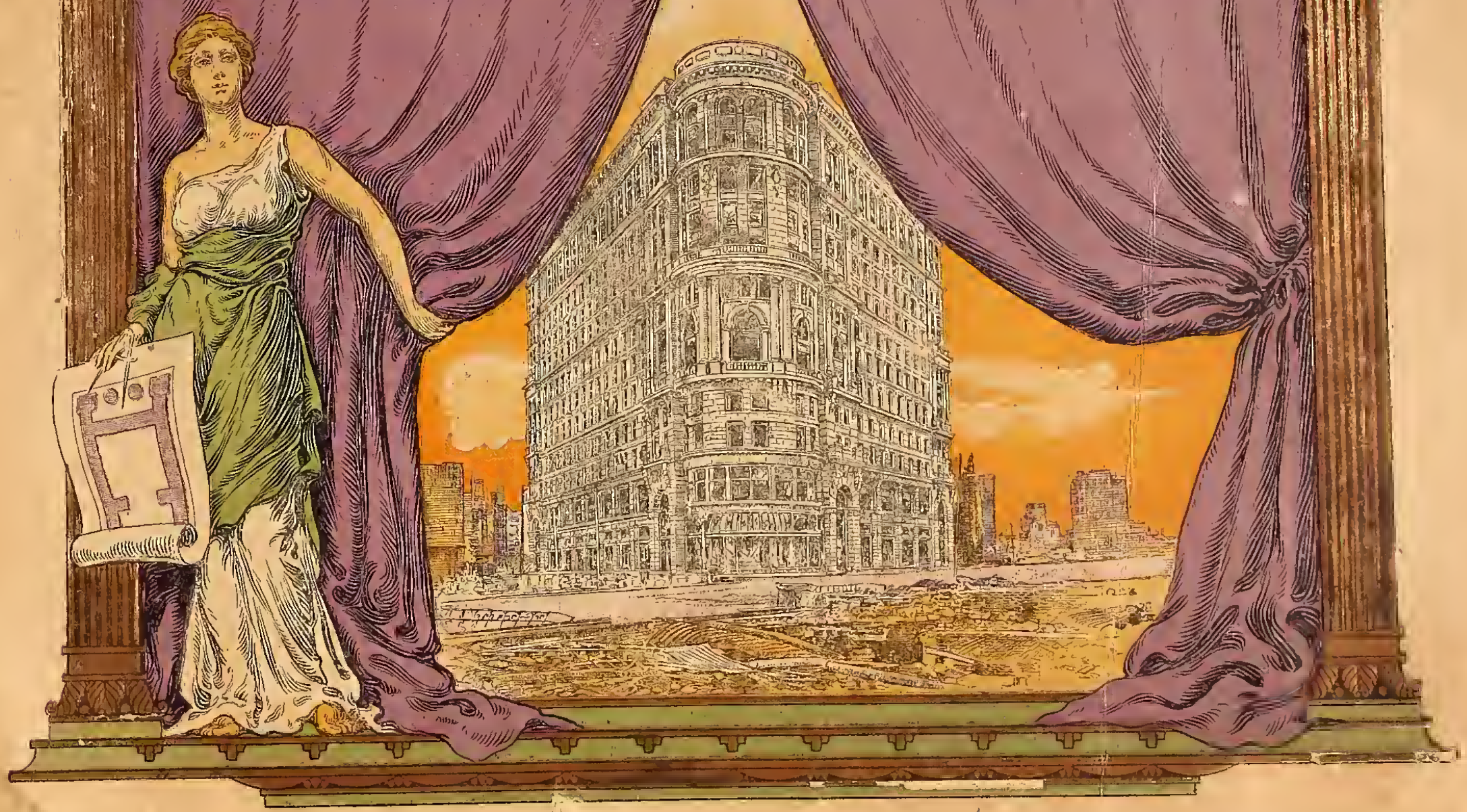
TRIAL BY FIRE AT SAN FRANCISCO

THE EVIDENCE OF THE CAMERA



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TRIAL BY FIRE AT SAN FRANCISCO

The Evidence of the Camera

PUBLISHED BY

NATIONAL FIRE PROOFING COMPANY

PITTSBURG
BOSTON
CLEVELAND
NEW YORK
PHILADELPHIA
MINNEAPOLIS
ST. LOUIS
LONDON, ENGLAND
CHICAGO
WASHINGTON
LOS ANGELES

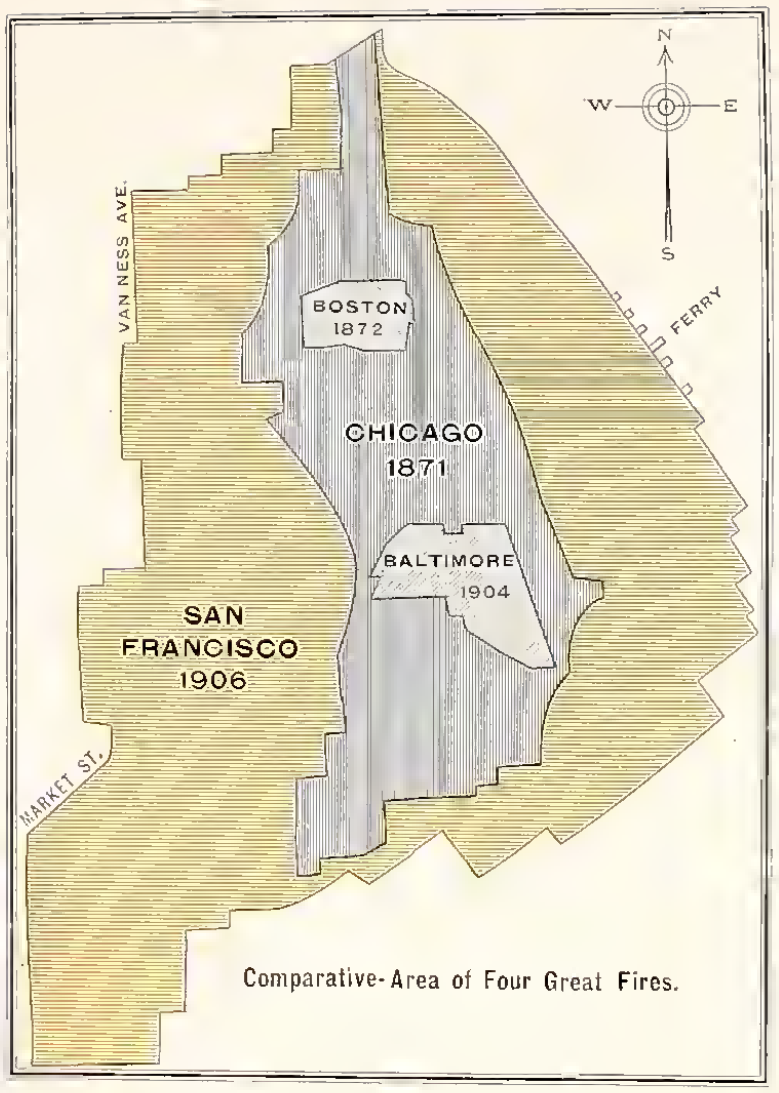
"A building that is of *non-combustible* material alone, is not *fireproof.*

"A building that is *thoroughly* fireproof may have a destructive fire *within it* but the building itself will not be wrecked or destroyed."

—*From "What is a Fireproof Building."*

Estimates of Fire Loss and Insurance
at San Francisco

$300,000,000 - Total Loss
$220,000,000 - Insurance
50,000 Buildings destroyed



Comparative-Area of Four Great Fires.

Comparison of Fire Loss in Europe and the United States

Country	Years	Fire Loss Annual Average	Population 1901	Loss per Capita
Austria	1898-1902	$7,601,389	26,150,597	$0.29
Denmark	1901	660,924	2,588,919	.26
France	1900-1904	11,699,275	38,595,500	.30
Germany	1902	27,655,600	56,367,178	.49
Italy	1901-1904	4,112,725	32,449,754	.12
Switzerland	1901-1903	999,364	3,325,023	.30

Or an average loss per capita of $0.33.

State	Five Years	Fire Loss Average	Population	Loss per Capita
Maine	1901-5	$2,240,158	694,647	$3.22
Massachusetts	1901-5	6,285,891	2,844,068	2.21
New Hampshire	1901-5	1,174,061	411,588	2.85
Ohio	1901-5	7,502,561	4,157,545	1.80

Giving an average of $2.12 loss per capita.

The total loss in the United States, as reported in the *Chronicle* tables and by the *Journal of Commerce*, was $866,617,705 for the five years ending with 1905, or an average of $173,323,541 per annum, which, upon a population basis of 70,000,000 gives a per capita loss of $2.47.

From Report of National Board of Fire Underwriters

SAN FRANCISCO BEFORE THE EARTHQUAKE

SAN FRANCISCO DURING THE FIRE

SAN FRANCISCO AFTER THE FIRE

"I seek not to make men read
but to make them think."

Montesquieu

"The whole success of fire proof construction depends primarily upon the materials employed, and none should be used that do not possess the necessary qualities."

General William Sooy Smith.

CALLAGHAN ESTATE BUILDING

This structure was what is known as a Class B. building. The columns and girders were steel but the floors and beams supporting the same were of wood. Note 4 inch thick *concrete covering* around steel columns secured in place by one-eighth steel wire wrappings. The photographs show that the concrete failed to resist the action of the fire notwithstanding it was bound to the column by wire.

"The great advantages possessed by cement or concrete as a fireproof material are its low heat conducting power and its very small expansion under heat. These advantages however are entirely offset by the fact that it loses its strength under heat, is ruined by water applied during a fire and will disintegrate after a fire if not during the fire itself. Disastrous results may follow from confidence in a building protected with such a material."

J. S. Dobie,
"Digest of Physical Tests and Laboratory Practice"

CALLAGHAN ESTATE BUILDING

A close examination of the concrete showed same to be absolutely dead and so soft and sandy that it would readily crumble between thumb and finger.

The failure of the concrete to remain on the columns coupled with the condition of the concrete would indicate that it had been completely disintegrated by the heat.

"Metal lath and plaster covers for steel columns were inadequate."

Report of
Capt. John Stephen Sewell, U.S.A.
Corps of Engineers

FAIRMONT HOTEL

Columns covered with wire lath and plaster were generally defective. In the Fairmont Hotel alone 37 such columns buckled and a portion of the floors of the building have settled down about seven feet from normal position.

Materials which are individually destructible by fire cannot be made fireproof by combining them.

FAIRMONT HOTEL

Corridor Sixth Floor. Metal lath, wire and plaster partitions. A typical condition of such partitions.

Dependence for fire protection upon materials which are non-combustible but not fireproof, is an oversight of the fact that the destructive quality of fire is *heat*.

FAIRMONT HOTEL

Fairmont Hotel—Corridor Second Floor. Partitions of expanded metal wire and plaster. There was evidently only moderate heat in this corridor as the plastering appears uninjured. It will be observed however that the double metal lath partition is expanded and bulged sufficiently to destroy alignment of the plaster cornice which appears but slightly injured. Note large section of metal lath at right. It is torn from its fastenings and lays on one side a useless wreck.

Insufficient column protection was, I estimate, the cause of 90 per cent of the damage actually done to the structural parts of the injured buildings.

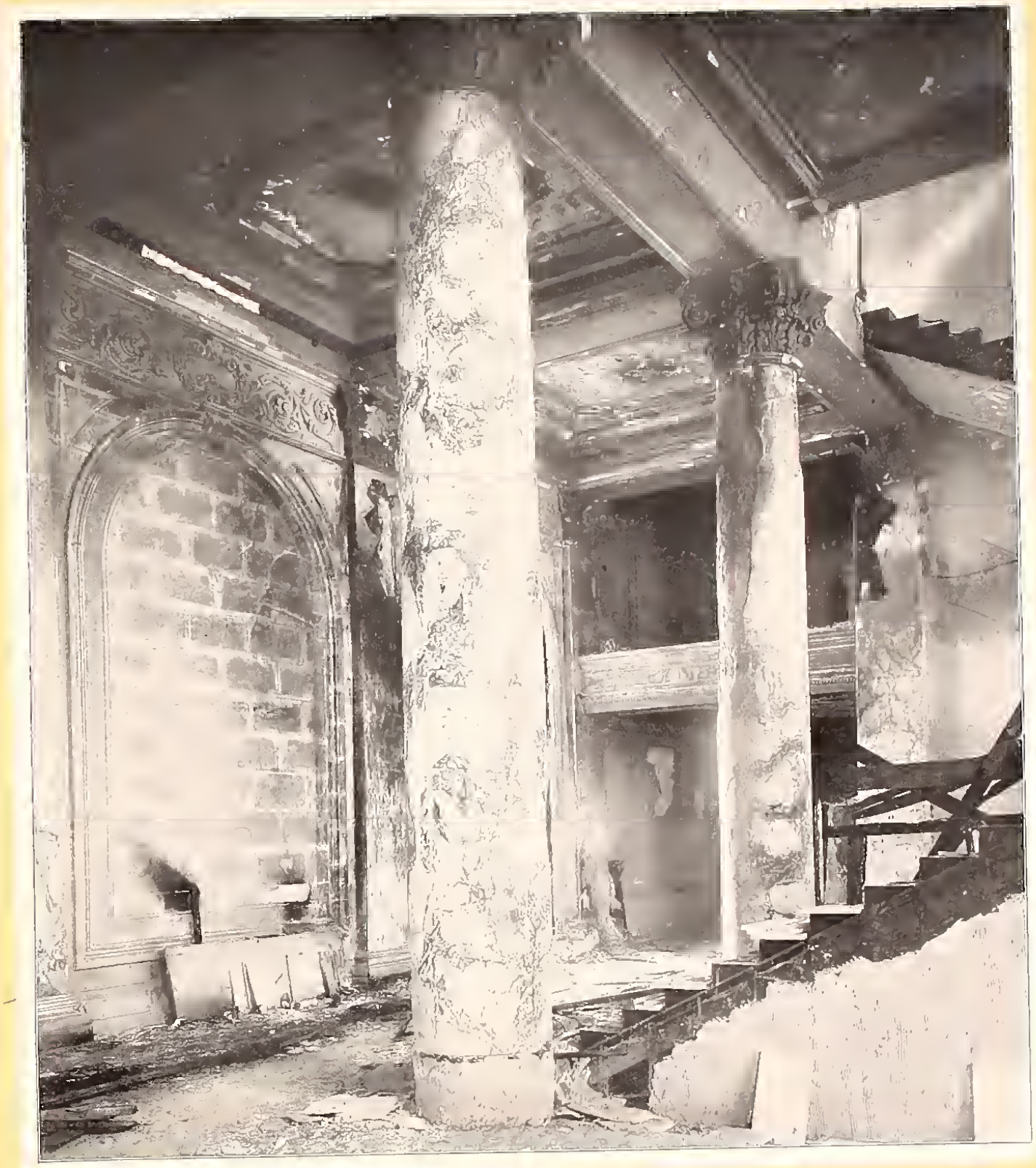
Report of
F. W. Fitzpatrick,
Secretary International Society Building Commissioners

FAIRMONT HOTEL
First Floor.

"Where suspended ceilings were used and *moderate heat* prevailed the ceilings proved a great protection to the concrete floors. Under *severe heat* the added protection was of little value."

Report of
E. V. Johnson
Vice President National Fire Proofing Co.

FAIRMONT HOTEL
First Floor.



The basic principle of fireproofing is isolation. Protect every open area from every other open area.

FAIRMONT HOTEL
Vestibule.

"By far the greatest damage to this building was caused by the inferior expanded metal lath and plaster column protection. * * * Had a few thousand dollars been spent in providing suitable column protection, a hundred thousand dollars in repairs would probably have been saved."

A. L. A. Himmelwright, C. E.
The San Francisco Earthquake & Fire
Published by the Roebling Construction Co.

FAIRMONT HOTEL

Second Floor, looking North on east corridor. Note every column buckled.

"The essential characteristics of a fireproofing material for buildings are:

1st It must be itself incombustible.

2nd It must be as nearly as possible a non-conductor of heat.

3rd It must be strong and durable."

General William Sooy Smith

ST. FRANCIS HOTEL

Typical interior of room. Partitions of hollow clay tile.

"Given a porous or semi-porous terra cotta to start with—of hard burned brittle material, of adequate thickness and weight, with heavy webs and partitions to all blocks, with well rounded fillets at all corners, and no better fire resisting material can be used."

J. K. Freitag, C. E.
Author Fireproofing of Steel Buildings

ST. FRANCIS HOTEL
Typical Corridor

A building that is only half fire proof is like a house divided against itself. It cannot go through the trial unscathed.

ST. FRANCIS HOTEL
Lobby

"That concrete is incombustible cannot be denied; that it will not disintegrate under fire cannot be maintained.

Rudolph P. Miller
Chief Engineer Bureau Buildings
City of New York

ST. FRANCIS HOTEL ANNEX

In course of construction. Reinforced concrete floors totally destroyed. Note condition of concrete remnants on sides of beams.

"There is certainly not a city in this country today which is free from the conflagration hazard. More, there is not a city which is not in great peril from this danger.

From "The City Unburnable."

ST. FRANCIS HOTEL, EXTERIOR
Before the Earthquake.

ST. FRANCIS HOTEL, EXTERIOR
After the Fire.

"We have not been able to locate a single instance in which structural damage resulted from failure of the terra cotta protection when it was applied in a reasonably thorough manner."

The Brickbuilder, June, 1906.

SHREVE BUILDING

Condition of vault protected by hollow tile.

"The architectural functions of partitions and their fire resisting arrangement should be worked out together."

"At least 95 partition constructions out of 100 show that the architectural functions of partitions are utilized while their fire resisting functions are hardly considered."

J. K. Freitag, C. E.
Author Fireproofing of Steel Buildings.

UNION TRUST BUILDING

Eighth Floor. Note condition of hollow tile floor arches. Damage nominal. Typical throughout this building. The earthquake did great damage to walls and light hollow tile partitions all through the city. This is demonstrated by the fact that many such were shaken down in buildings where there was no fire whatever — notably the Ferry Building.

"Hitherto architects and engineers who devote themselves to reinforced construction appear to be so confident of the strength and stability of this new structural material under all conditions that they fail to give reasonable attention to the fire resisting qualities of the materials they use; being quite content to declare that steel rods embedded in concrete must be more fire-resisting than any other combination of materials."

James Sheppard, A. I. E. E.
Member Executive Board British Fire Prevention Committee.

JOHNSEN BUILDING

This building was four stories high, built with cast iron columns and steel girders, spaced 16 feet from center to center. The steel girders were fireproofed on the sides with concrete, between these girders concrete beams with steel reinforcement were set, spaced 5 feet from center to center. On top of these concrete beams and forming part of the same, a 4-inch thick concrete slab floor was spread over the entire area. This is a typical reinforced monolithic concrete construction, so far as the portion between the steel girders is concerned. A careful examination of the photographs will show that the reinforced concrete beams failed to fulfill their mission. It will also be observed that these concrete beams were protected with a metal lath ceiling, but notwithstanding this additional protection the floors of the building were completely wrecked.

"Reinforced-concrete is claimed by its advocates to be a safe structural material, but this can only be conceded so long as normal conditions continue, which many users of these new structural methods appear to consider will always be the case, and therefore make no provision against possible if not probable changes resulting from fire amongst the goods stored in buildings of this construction."

James Sheppard, A. I. E. E.
Member Executive Board British Fire Prevention Committee.
Before Milan International Fire Congress.

JOHNSEN BUILDING

In several cases the cast iron columns show the effects of heat by warping, but it is evident from the photographs that the *steel girders* maintained their integrity, and the collapse of the building was caused by the failure of the reinforced concrete beams. Note the long pieces of concrete which hang down from the upper girders, being held in place by the steel reinforcing members which were securely attached to the steel girder. It is impossible to study these photographs carefully, without realizing the danger of depending upon *concrete beams* or *girders reinforced* with steel members imbedded therein, when there is any danger of such beams being attacked by a moderately hot fire.

"It is false economy of the worst description to omit efficient protection against the action of fire for all structural metal work."

James Sheppard, A. I. E. E.
Member Executive Board, British Fire Prevention Committee before Milan International Fire Congress 1906

HOTEL ALEXANDER

Typical condition of columns covered with wire cloth and plaster.

"It is to be feared that some of the large buildings already erected with reinforced-concrete will fail when subjected to a serious fire among their inflammable contents."

James Sheppard, A. I. E. E.
Member Executive Board British Fire Prevention Committee.

Wreck of reinforced concrete building, Powell and Sutter Streets.

"Under temperatures of from 800 to 1000 degrees F. possibly under temperatures as low as 600 degrees F. Portland cement which has set begins to lose its water of crystallization. As long as the necessary temperature is maintained the loss progresses, until finally all or most of the water will be driven off and the cement or concrete will have lost most of its strength, in fact will be ruined."

Captain John Stephen Sewell,
Corps of Engineers, U. S. Army.

WELLS-FARGO BUILDING
Roof

WELLS-FARGO BUILDING
Roof.

"Experience has repeatedly proved that large buildings constructed with incombustible materials only, but without due protection against the inevitable action of heat, fire and water on the metal and other materials used, although called "fireproof," are during the burning of their contents of a most treacherous and dangerous character, defying all reliable calculations as to the time and manner of their collapse."

James Sheppard, A. I. E. E.
Member Executive Board British Fire Prevention Committee

"It was a very common practice in San Francisco where reinforced concrete slabs were used to have also a furred ceiling attached to the covered flanges of the floor beams. Where this ceiling was well put in it resisted the fire for quite a time. Under such circumstances the floor slabs were comparatively little damaged. At other points where they received the direct impact of the flames for an appreciable time it was evident that the damage was quite serious. The cement had lost its water of crystallization and the concrete was dead and friable from a considerable depth from its surface. Although there was no doubt whatever that their strength was seriously impaired they stood up and presented a very fair appearance; no doubt the average layman would think they had come through quite successfully."

Captain John Stephen Sewell

Constructional lessons from San Francisco
From Concrete and Constructional Engineering

MONADNOCK BUILDING

Basement. An examination of all floors above the first in this building showed very little damage from fire. The window frames on the Market Street front were scorched on several stories but all the court window frames and East wall frames were intact, apparently having been protected by the opposing solid brick wall of the Examiner Building. Wood flooring, doors and trim on upper floors not even scorched and plastering uninjured.

"In reinforced concrete floor construction the strength is almost wholly dependent upon the light steel tension rods or bars, which economy requires to be imbedded at or near the under surface. In the case of a fire the light metal in this exposed position soon becomes heated, and by expansion and deflection disrupts the thin concrete covering under it. After the steel tensile members are exposed, temperatures of 1200° F. soon cause failures."

A. L. A. Himmelwright, C. E.

The San Francisco Earthquake & Fire
Published by the Roebling Construction Co.

MONADNOCK BUILDING

Basement. At the south end of the basement, however, two steel columns which were not covered with any fire proofing were subjected to sufficient heat to cause same to buckle. Also at this point in the basement there was sufficient inflammable material to burn off the suspended ceiling and cause the collapse of four concrete beams reinforced with the Johnson patent bar. It is apparent from these photographs that the heat was sufficient to expand the reinforced bars to an extent sufficient to burst through the concrete covering, destroy the homogeneity of the beam and allow the same to collapse as shown.

"It seems more than probable that the better appearance of the reinforced concrete floors will cause a great many people to ascribe a fictitious value to the fire-resisting qualities of reinforced concrete."

Captain John Stephen Sewell
Constructional Lessons from San Francisco Concrete and Constructional Engineering, London

MONADNOCK BUILDING

Basement. Observe the reinforcing bars turned up at the ends to overcome sheer strains.

"Structural duty and resistance to fire should be differentiated. The same material should not in an ideal design be expected to perform both duties."

Captain John Stephen Sewell

Constructional Lessons from San Francisco
Concrete and Constructional Engineering, London

YOUNG BUILDING

This is a view taken from the second floor of this building looking upward. At the point where the collapse took place, there was a pile of sheet iron stored, which weighed about 200 pounds to the square foot. This accounts for the collapse as the structure was unable to resist the heat below and support the dead load on the floor above. This building is five stories high and was built with steel columns and steel frame throughout. The girders were 16 feet center to center and the Golding System of fireproofing was built in between the girders. The heat in this building was not extreme as it will be observed that neither metal lath or plastering on the columns was destroyed. The first floor of this building was protected with a metal lath ceiling and was not seriously injured. The uncollapsed portion of the three upper floors and roof, however, have all sagged from 9 to 24 inches and will have to be removed in order to make the building tenable. This building was occupied by the Seller Brothers Company, wholesale hardware dealers. Almost the entire *contents* were non-combustible, being of metal.

"If such beams or slabs are exposed to a fire and the concrete is damaged so as to expose the bar or so as to leave a very small thickness of undamaged concrete below it, the only way to make adequate repairs is to tear out and rebuild the damaged beams and slabs as a whole. The loss is total, in fact greater than the original cost even if collapse does not occur as a result of the fire."

Captain John Stephen Sewell,
Corps of Engineers U. S. Army

ACADEMY OF SCIENCE BUILDING

This structure suffered severely from the effects of the fire. Observe one inch twisted reinforcing bar expanded by heat sufficient to badly rupture the concrete beam and expose the other tension members to the action of the fire. Note also the numberless cracks in the concrete beams and the monolith floor carried by the same. All this work is ruined and will have to be removed.

"Experts on reinforced-concrete buildings agree that to obtain the best results (considered only from a structural point of view and under normal conditions) reinforcing rods must be placed near the outer surface of the concrete, a thickness of one inch in front of the rods being generally adopted; but this thickness is altogether insufficient for the protection of metal rods against a serious fire, and the aggregates, sand and cement, for the concrete used to protect the metal rods, are of the greatest importance.

"The American National Board of Fire Underwriters, in their carefully considered Building Code, recommend that the thickness of protecting concrete for all important metal members in columns and beams of reinforced-concrete should be not less than 4 inches."

James Sheppard, A. I. E. E.
Member Executive Board British Fire Prevention Committee

ACADEMY OF SCIENCE BUILDING

This photograph portrays the twisted steel reinforcing members denuded of concrete protection by the action of the heat. A continuous fire for a period of one hour on steel work exposed in this manner would result in its absolute collapse. As it is, the floors of the Academy of Science Building where subjected to fire are badly wrecked and their removal will be necessary to make the building tenable.

"The materials employed in reinforced-concrete acquire no new fire-resisting qualities. * * * It is necessary (to secure such qualities) duly to consider and provide against the effect of heat, fire and water on the materials employed, using only materials and methods proved from actual experience under various known conditions to be effective."

James Sheppard, A. I. E. E.
Member Executive Board British Fire Prevention Committee

SLOAN BUILDING
Interior First Floor.

"Divisional walls relied upon as fire stops in warehouses and similar buildings should not be less than nine inches thick.

"In a fire test made in a reinforced-concrete box on thick walls enclosing about 175 cubic feet, moisture was freely driven through the sides of the box, two of which were six inches thick and two four inches thick. The evaporation of this moisture kept the outer side of the concrete cool, but on the passage of moisture ceasing, which it did at the end of the test of forty-five minutes' duration, the outer surface of the concrete became very hot.

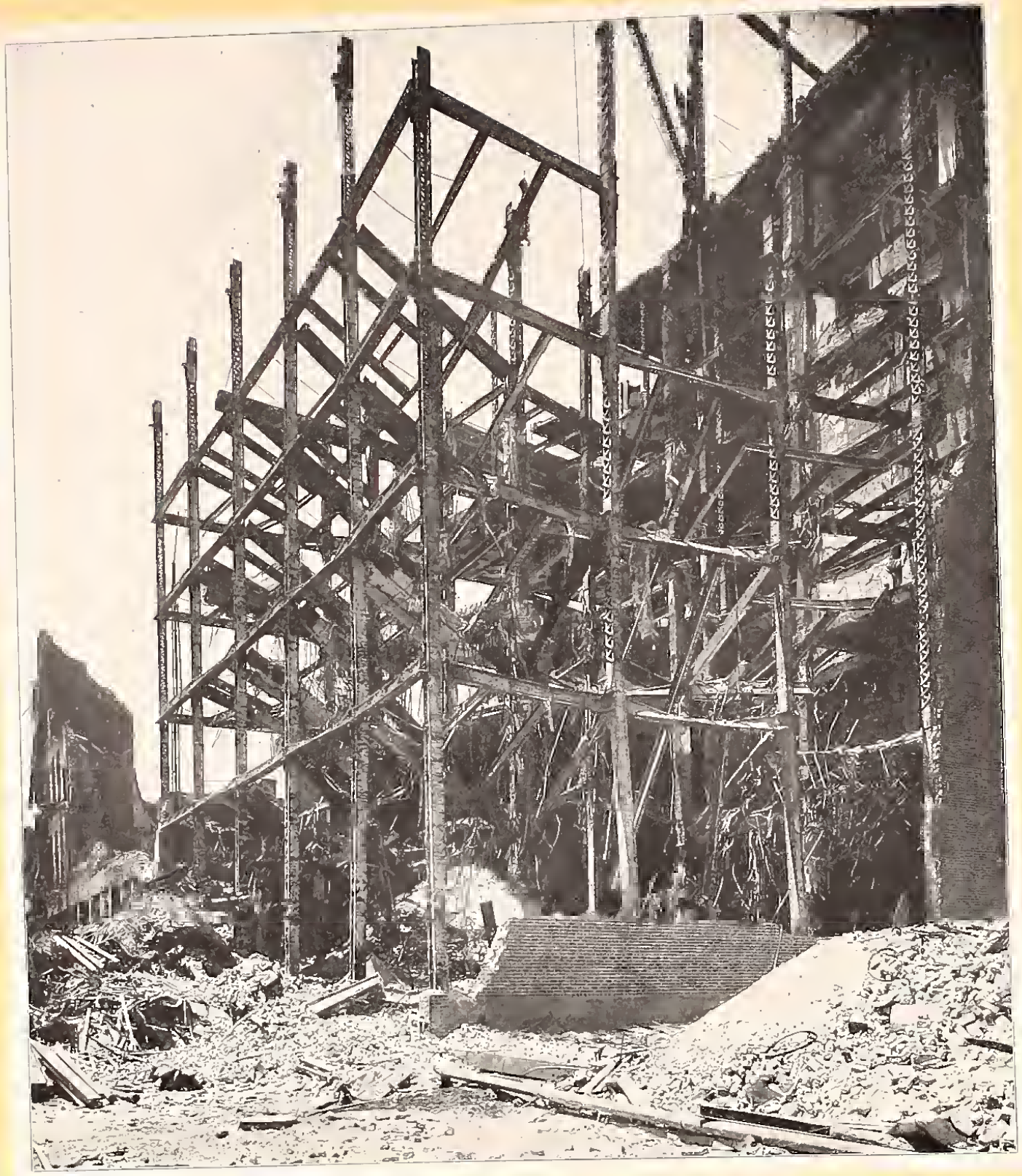
"Combustible goods against a reinforced-concrete wall less than nine inches thick would be liable to ignition by heat from a fire burning on the opposite side of the wall."

James Sheppard, A. I. E. E.
Member Executive Board British Fire Prevention Committee

SLOAN BUILDING
Rear of First Floor

"We regret that it has not yet been recognized by those who design works in reinforced-concrete, that the material is not *ipso facto* to be classed as a fire resistant. * * * Seeing the materials used are incombustible all too great a confidence is placed in them."

Editorial, The Builders Journal and Architectural Engineer,
London, August 1st, 1906



KAMM BUILDING
Rear View

"Reinforcing steel members covered to a depth of one inch reached a temperature of 770° F. in an average time of 59 minutes for the eleven samples. Those with two inch covering attained the same temperature in an average of two hours and 20 minutes and those protected by three inches of material in two and one half hours average."

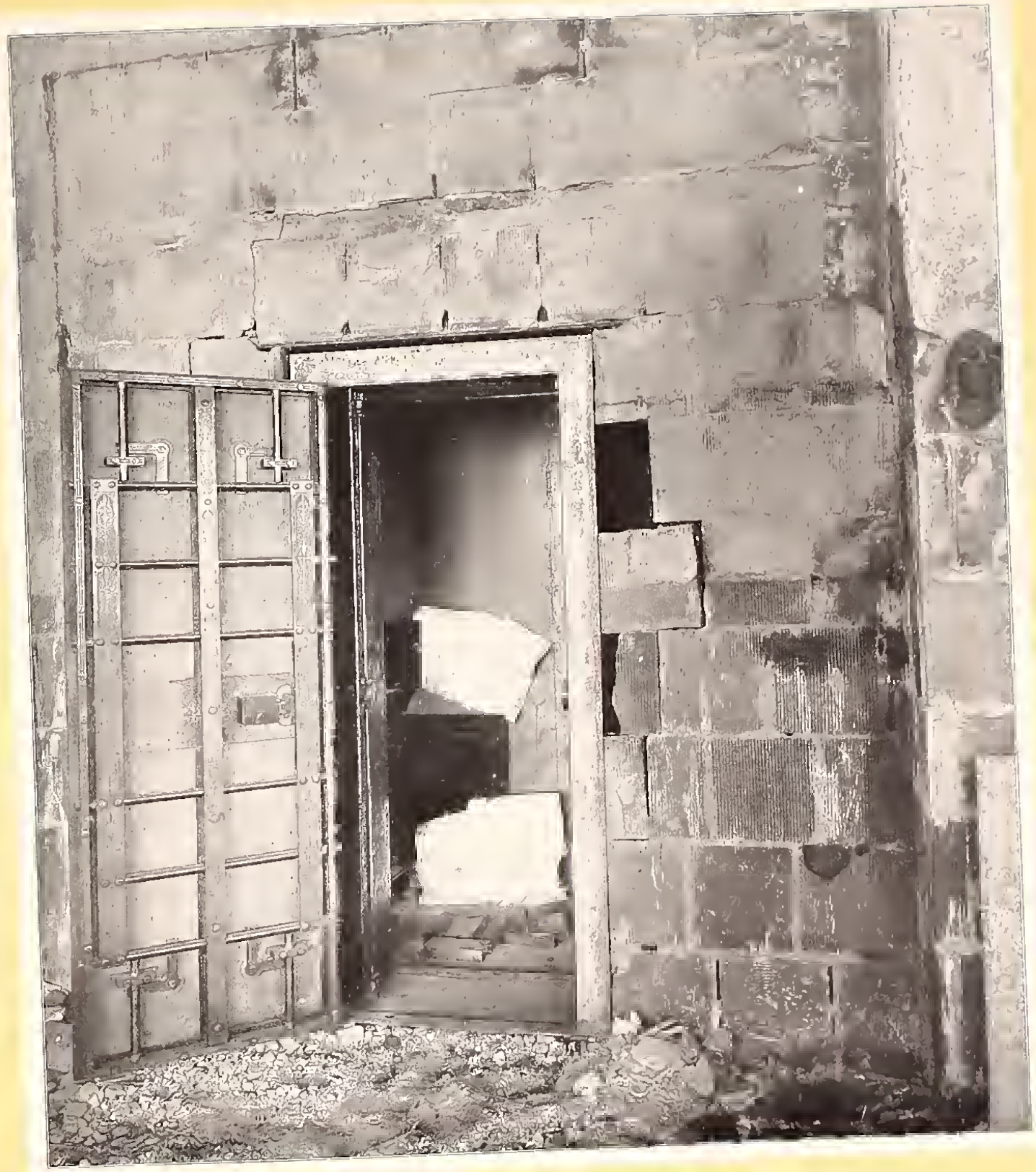
Report of test of reinforced concrete beams at Underwriters Laboratories, Chicago Engineering Record, July 22, 1905

KAMM BUILDING
Fifth Floor

"In all buildings where the steel work, including columns and girders, were *properly protected* with *fireproofing material*, the steel portion of the structure now stands absolutely uninjured."

Report of E. V. Johnson
Vice-President National Fire Proofing Co.

SPRING VALLEY WATER WORKS BUILDING
Second Floor.



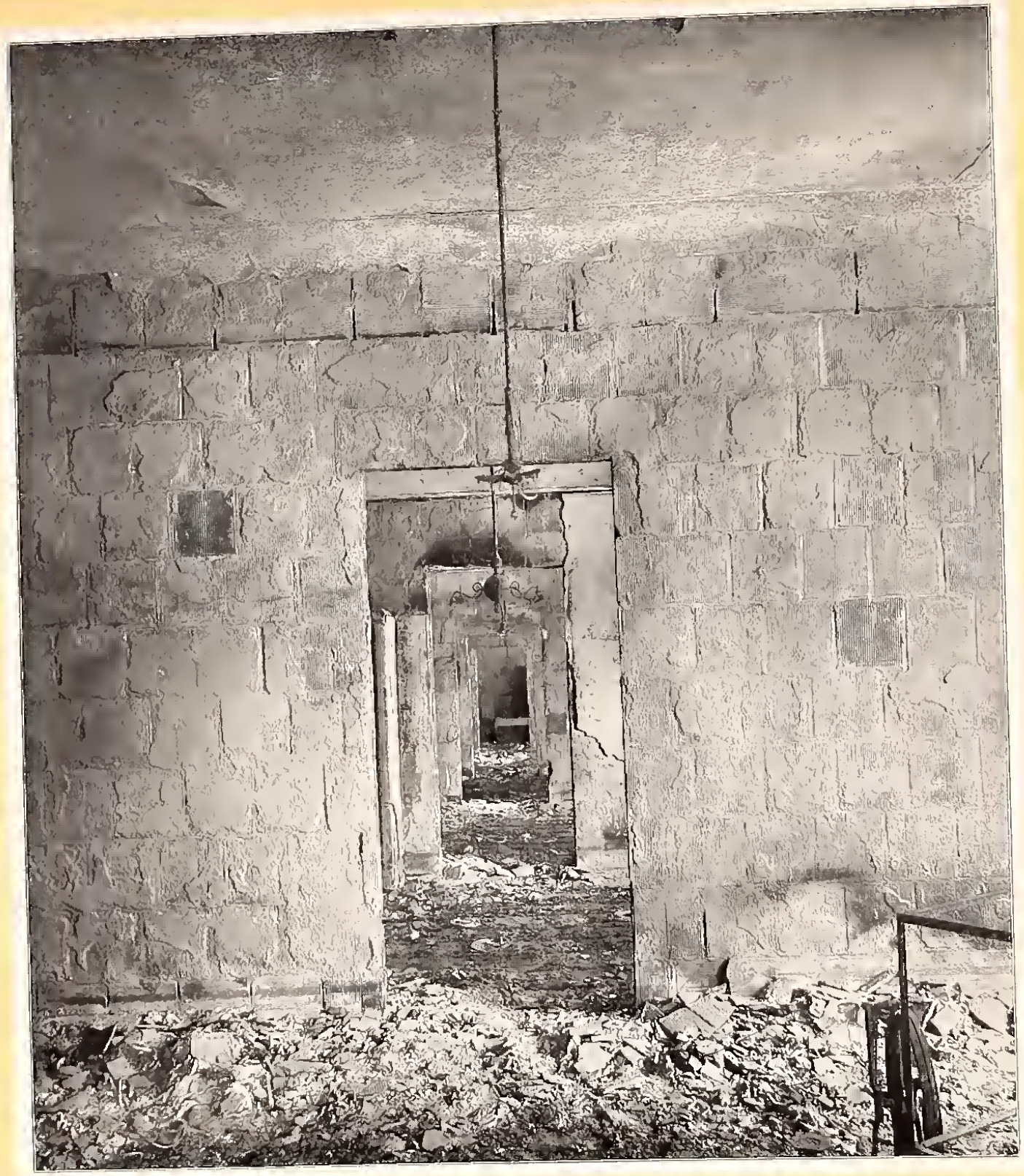
"So called fire proof vaults in line with the partitions whether of metal lath or fire proof tile, with *single* doors of thin sheet iron, were found to be of no value whatever as a protection to the contents, vault doors in each case expanding and buckling outward, permitting the flames' ingress to the contents of the vault. Vaults with *double doors* built in place with a proper thickness of fire proof protection around the same, protected the contents of the vaults fully as well as the fire proof safes."

Report of E. V. Johnson,
Vice-President National Fire Proofing Co.

SPRING VALLEY WATER
WORKS BUILDING
Vault.

"Up to that time (the Chicago Fire, 1871) the incombustible system of building which had been the result of the introduction of rolled I-beams in France and Belgium in 1854, and in England and the United States in 1855, were thought by most architects to be sufficiently fireproof for practical purposes. Cast and rolled iron were used with brick for interior constructions with indifference to the effects of heat upon iron. There had been few destructive fires in such buildings until attention was attracted to the destruction of a cotton mill at Oldham in England. But the Chicago conflagration gave evidence everywhere of the unreliability of iron in a severe fire; for quite a number of incombustible buildings were destroyed, and none were saved which had been directly exposed. Experiments in protecting iron construction with clay products slowly followed this revelation, and it was several years before they received recognition."

Peter B. Wight, F. A. I. A.
Paper read at the 7th International Congress Architects, London, July, 1906



SPRING VALLEY WATER WORKS BUILDING
Fourth Floor.

THE structural parts of a building are *columns, girders* and *beams*. These may be called the *bones* of a building. The strength and life of every building depend upon the efficiency of these parts to endure strains quite as much as the endurance of the human body depends upon a healthy condition of the bone structure.

Destroy these "bones" of a building, there is nothing left but the foundation and possibly the insecure bare walls, unbraced and ready to fall.

For more than fifty years, builders have sought a material for structural parts, which would fill the demand for structural strength and efficiency and which would at the same time be self-protective against the attack of fire. A material which would possess inherently, without the protection of any other substance, the ability to go through an attack of fire and preserve intact its shape and its full original strength and capacity. In other words a satisfactory structural material which would be *fireproof*.

Half a century ago it was firmly believed that this material had been found in cast iron. Thousands of unprotected iron structures with the old time "fireproof-iron fronts" were built.

A short time proved their inefficiency against utter destruction by fire. Then followed the era of unprotected "fireproof steel," a fallacy so deeprooted that, even today, thousands of men believe bare steel to be a fireproof structural material.

In the present day and for the past few years, unprotected concrete is exploited as a structural material which is self protective against fire.

We believe the evidence of the camera shows that there is no structural material which will protect itself against fire. That it demonstrates clearly, the fact that the structural members of a building, of any material now known, are not safe against the attack of fire, unless protected by some other substance which *is* thoroughly fireproof.

We submit further, that the evidence shows that the only material which fully demonstrated its complete ability to protect the structural members of buildings in the San Francisco conflagration was Porous Terra Cotta Hollow Tile Clay Fireproofing.

The efficiency of "Hollow Tile" as evidenced in these pages is directly in line with the uniformly excellent results it has shown under every similar test in the past thirty years.

"The most approved type of fireproof building, on account particularly of the bracing, is the steel skeleton with floors of terra cotta arches."

W. L. B. Jenney

MILLS BUILDING

12" end construction hollow tile arches were used for the floors of this building, built in place between 15" I beams. 4" hollow blocks laid flat were used to fill spaces from top of arch to top of 15" I beams. This structure was subjected to *extreme heat* evidenced by melted cast iron mullions, stair railings, platforms, etc. It is estimated that 5% of the tile arches remaining in the building would have to be removed on account of damage from falling weights, and that 20% of the entire area of the floors from which the soffits of the tile had dropped would have to be repaired. The cost of making good all the floor arches in this building should not exceed 5% of the original cost of the work.

"On Nov. 9th, 1905 the Old Chronicle building passed through a severe fire which started in the wooden clock tower. That fire was confined entirely to the combustible tower and the building proper was in no way injured, its fireproof construction saving it intact."

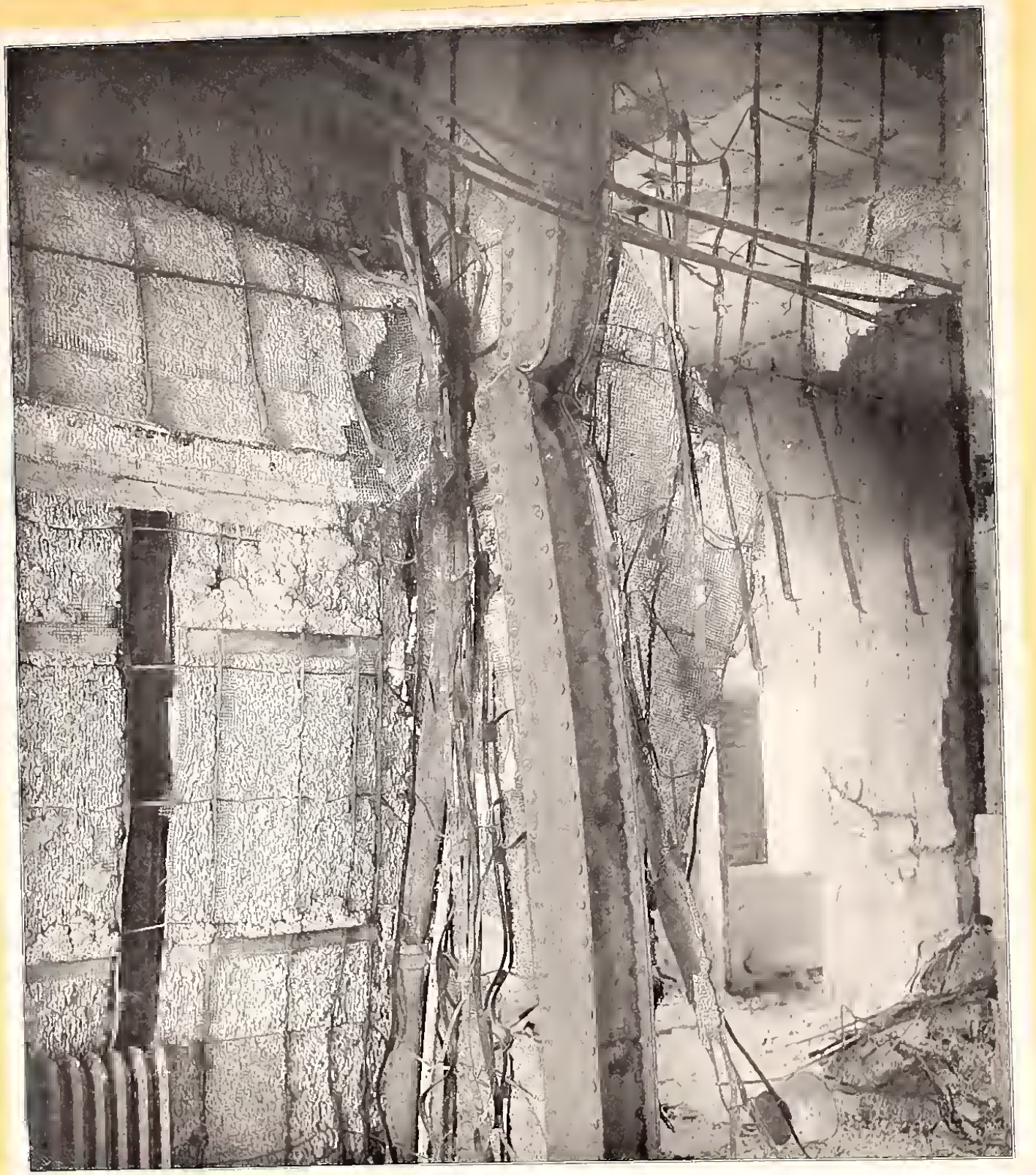
Fireproof Magazine, December, 1905

OLD CHRONICLE BUILDING

Seventh Floor. The floor arches used were what is known as "side pressure" arches without any interior webs. This style of arch is obsolete in general practice today, the end construction arch being used in place of the old style method. The entire interior of the one-half of the old Chronicle Building is wrecked. All the cast iron columns, steel girders, and beams together with the contents having dropped through from the top floor to the basement. The Superintendent in charge of this building informed the writer that there were nineteen linotype machines and a large amount of type metal stored on the upper floor of this building. If the heat on the floor below was sufficient to deflect the steel girders and beams and allow the tile arches to rupture, nothing could prevent the entire concentrated weight falling into the basement.

"The future should bring a construction with the exposed surface composed of a burnt clay product, and an interior of concrete surrounding a nucleus of steel."

W. I. Parry, C. E.



HOTEL HAMILTON

"Either fireproof well or not at all."

"Poor fireproofing is apt to be a total loss under severe fire test while good fireproofing even if somewhat damaged will permit of speedy reconstruction."

J. K. Freitag, C. C.
Author Fireproofing of Steel Buildings
February, 1906

HOTEL HAMILTON

"A building all the interior surfaces of which are of fire clay covered with plain lime mortar; in which as little as possible of anything else is used, and the floors of which are finished with Portland cement, may now be considered the nearest approach to an absolutely fireproof building."

The Brickbuilder
June 1905

FLOOD BUILDING
Circular Room

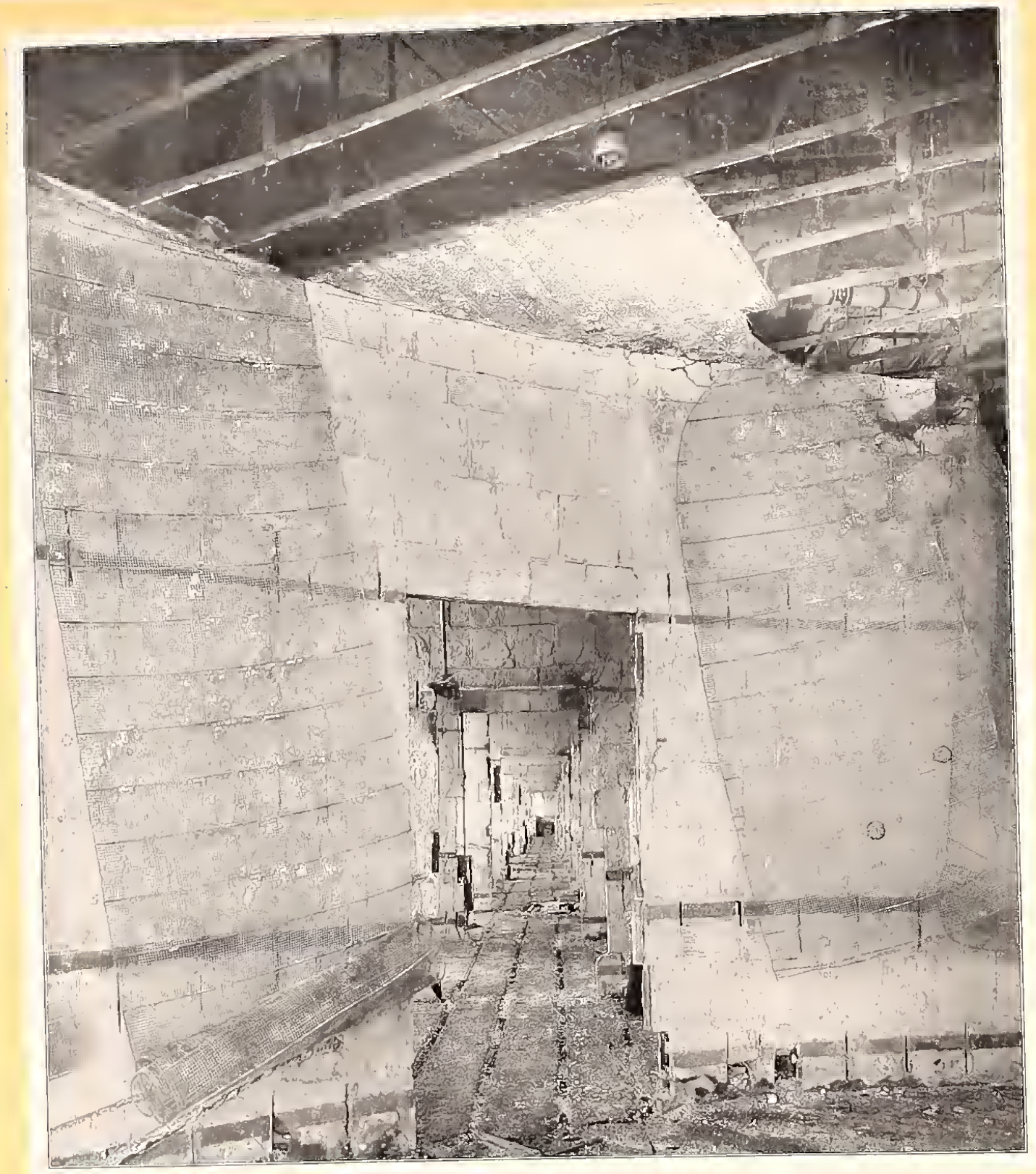
"Partitions should be built of at least 4 inch hollow porous tile, not on top of a finished wood floor nor on the concrete filling and wood strips, but on the solid bearing of steel and floor construction."

F. W. Fitzpatrick
Secretary International Society of Building Commissioners

FLOOD BUILDING
Seventh Floor

"A building really well constructed and designed is its own insurance."

F. W. Fitzpatrick
Secretary International Society Building Commissioners



FLOOD BUILDING
Top Floor

"A broken tile is quite evident and can be easily replaced. Weakened joints can be refilled with good cement and the work is equal to new."

F. W. Fitzpatrick
Secretary International Society Building Commissioners

FLOOD BUILDING
Seventh Floor

"I know of no other way to judge of the future save by the past." *Patrick Henry*

For thirty years hollow tile fireproofing has successfully protected the structure of every building in which it has been properly used.

FLOOD BUILDING
Corridor Third Floor

A building is not fireproof unless it is made so in every detail. If the structural parts only are fireproofed and the structure comes through unscathed then the fireproofing has done its work

FLOOD BUILDING
Before the Earthquake

FLOOD BUILDING
After the fire
See illustration in cover design.

"Both the strength and elasticity of concrete were rapidly diminished by the application of comparatively low heat for moderate periods of time." "If it were thoroughly heated to 1500° F. its strength and elasticity were largely dissipated."

Prof. Ira H. Woolson,
Report of a test before the American Society for Testing Materials.

SCOTTS BUILDING
Roof

Terra Cotta Hollow Tile fireproofing has been tested in the crucible of practical fire conditions for over thirty years and has never been found wanting.

NEW YORK MUTUAL LIFE BUILDING
Sixth Floor

"There were a sufficient number of instances of total and partial failures and enough diversity in the size and manner of employing the reinforcing material, to fully warrant the conclusion that reinforced concrete when used for floor construction, possesses relatively much less fire resistance than either the segmental arch or the short span flat slab types. Its use should therefore be limited to locations subject to moderate heat only."

A. L. A. Himmelwright, C. E.

The San Francisco Earthquake & Fire
Published by the Roebling Construction Co.

RIALTO BUILDING
First Floor from entrance looking South

No building can be fireproof without the use of proper materials. No materials can make it fireproof without proper designing and construction.

CASTLE BROTHERS BUILDING

Vault. Note that the openings in these vaults are protected with an outer and inner door separated by a vestibule about 12 inches deep. The contents of both these vaults went through the fire without injury, as did a great many hundred of similar vaults throughout the burned district. In all cases where *extreme heat* conditions prevailed the single door vaults proved to be useless as a fire protection to contents. The writer recommends double thicknesses of hollow tile for the walls of all vaults used in office buildings and each vault to be protected with double doors with at least 12 inches vestibule space between the same.

To name as "fireproof" any system of construction which will permit fire to go through the subdividing partitions is to make a mockery of the term.

HALL OF JUSTICE
North side of Basement

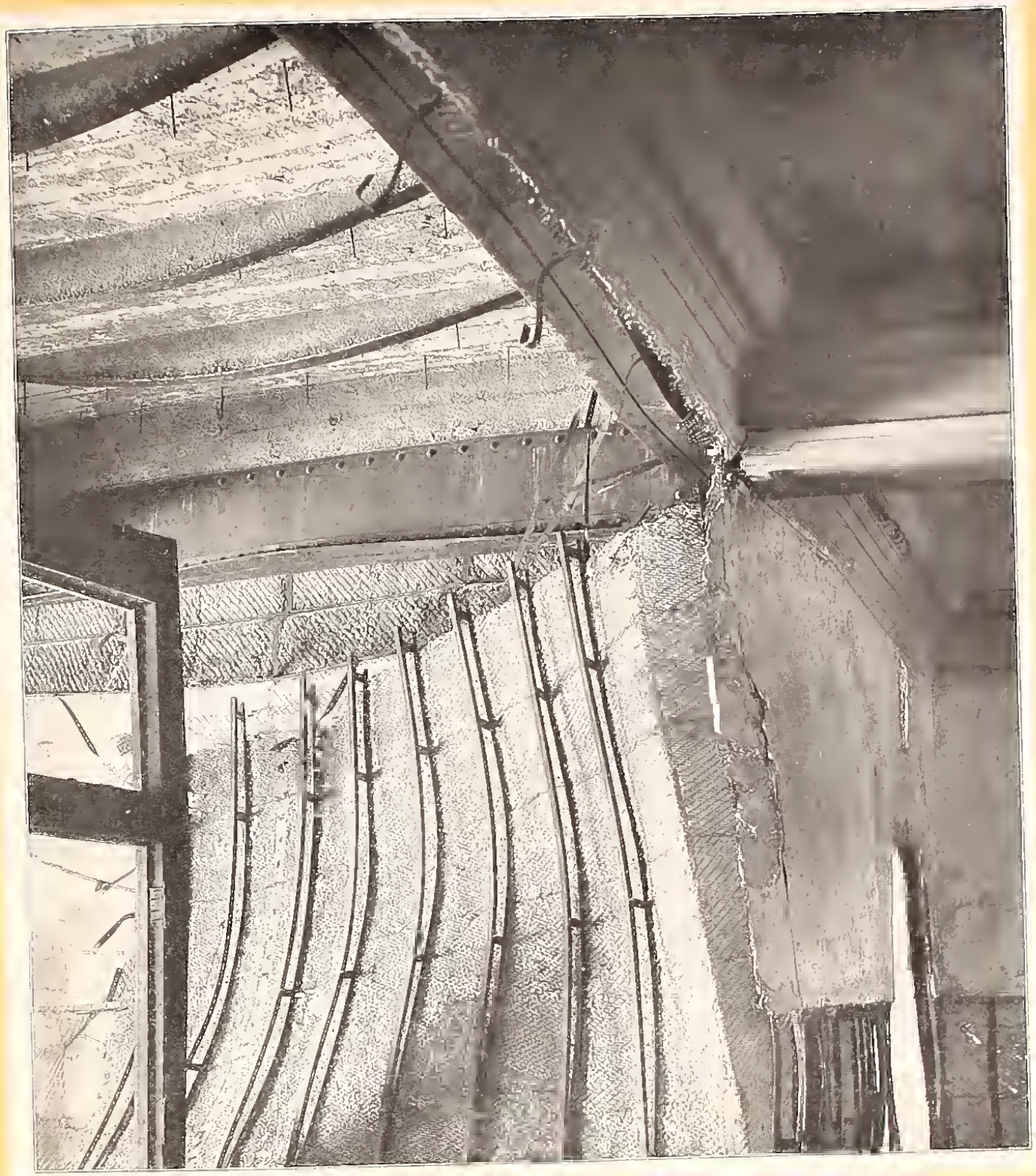
HALL OF JUSTICE
East side of Basement

"It would not be surprising, however, if the future tendency in the more important buildings should be to treat reinforced concrete as a structural material pure and simple and to protect it much as steel work is now protected."

Captain John Stephen Sewell
Constructional Lessons from San Francisco
From Concrete and Constructional Engineering, London

There are no greater fallacies than those which exist as to fire-proof building materials and methods. Yet the evidence is and always has been plain to those who would study the subject.

HALL OF JUSTICE
South side of Basement



If concrete when partially protected can not save itself from disintegration by heat it would certainly appear to be of little value as a fireproof material.

HALL OF JUSTICE
Wall South side of Entrance

No material can be said to be fireproof which will disintegrate under the action of fire no matter how slowly. It must wholly resist fire or it is not fireproof.

HALL OF JUSTICE
Northwest Corner Second Floor

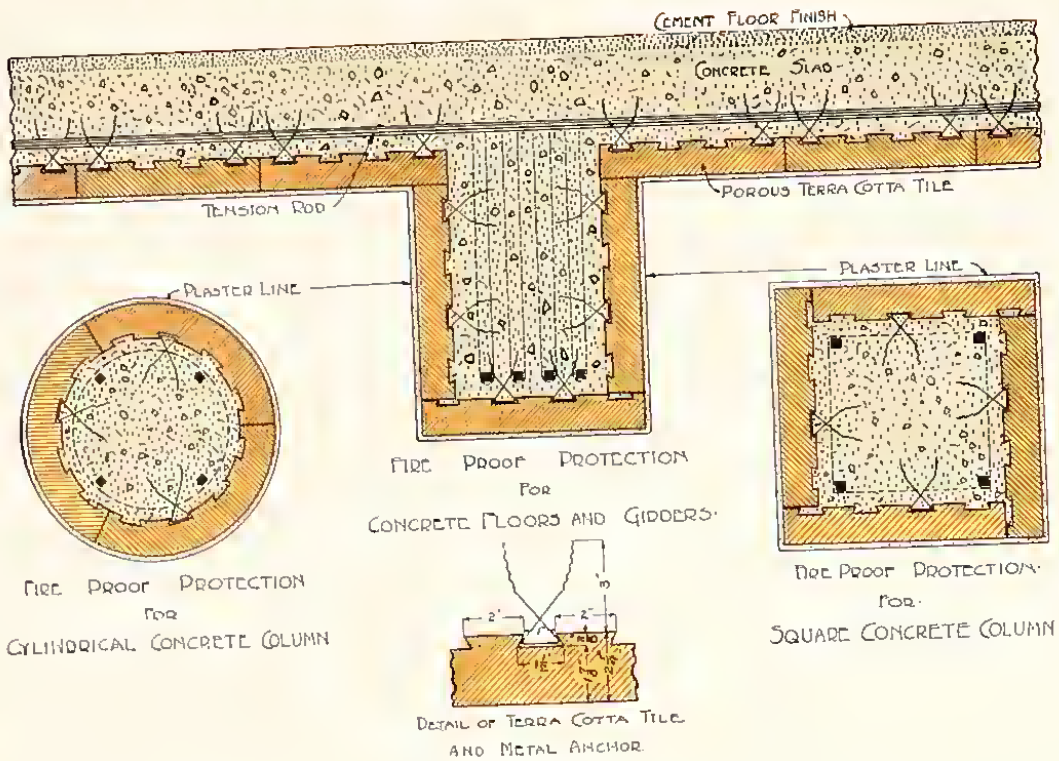
Practically fireproof is a qualifying term that leads only to disappointment. To be practically fireproof a material must be wholly so, or it is not fireproof at all. . .

HALL OF JUSTICE
First Floor

Make Concrete Buildings Fireproof

By protecting them with

POROUS TERRA COTTA TILE



FIRE PROOF PROTECTION FOR CYLINDRICAL CONCRETE COLUMN

FIRE PROOF PROTECTION FOR CONCRETE FLOORS AND GIRDERS.

DETAIL OF TERRA COTTA TILE AND METAL ANCHOR.

FIRE PROOF PROTECTION FOR SQUARE CONCRETE COLUMN

We will promptly submit plans and estimates for fireproofing any concrete building.

Illustration shows one of our methods for protecting concrete columns, girders and floors.

The evidence of the camera (as well as the statements of eminent authorities) shows clearly that when unprotected concrete is attacked by heat it loses a large proportion of its strength even if it does not totally fail during the fire. Particularly is this danger present with columns, girders and beams built of *reinforced* concrete.

If these structural members, the "bones" of a building, upon which the building's life and strength depend, are attacked by fire, with consequent exposure of the steel reinforcing members, the structure will be in great danger of destruction by collapse.

If further evidence of the necessity for fireproofing concrete were needed it is shown in our Blue Book of tests on protected and unprotected reinforced concrete columns, a copy of which we will be glad to send to any address upon request.

In addition to protection afforded to columns built under above method, the great expense of wooden centering (necessary under present methods) is saved.

NATIONAL FIRE PROOFING COMPANY

Manufacturers of

POROUS TERRA COTTA HOLLOW TILE

CONTRACTORS FOR CONSTRUCTION OF FIREPROOF BUILDINGS

CHICAGO, Hartford Building
NEW YORK, Flatiron Building
PHILADELPHIA, Land Title Building
MINNEAPOLIS, MINN., Lumber Exchange
WASHINGTON, D. C., Colorado Building
BOSTON, 840 Old South Building
LONDON, ENG., 27 Chancery Lane
PITTSBURG, Fulton Building
ST. LOUIS, MO., Victoria Bldg.
LOS ANGELES, CAL., 511 Union Trust Building
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